

20 March, 1961

Surgical Research Laboratory
Thoracic Surgical Clinic

Dr. John H. Peters
Assistant Medical Director for Research
American Heart Association
44 East 23 Street
New York 10, N.Y.

Re: Grant 60 G 70

Dear Dr. Peters,

On March 30, 1960, I wrote to ask whether it might be possible for me to utilize some part of the above grant from the American Heart Association to support work to be done at the Karolinska Institut during my sabbatical year, ending in June, 1961, ten weeks from now. You indicated in your answer, April 5, 1960, that such a proposal was within the policies and procedures of the Association, but that it would be your recommendation that I postpone making a formal request for these funds until such time as my actual need for them should become clear.

I should like to have this letter serve as a combined progress report and request for permission to use some of the funds of this grant in Stockholm.

During the time since my arrival here in July, 1960, Dr. Åke Senning, Dr. David Hall, of the University of Georgia, Dr. Juan Moreno, of Cordoba University, Argentina, and I have been working together. We have found that partial left heart bypass of more than 25% of cardiac output results in a reduction of oxygen utilization as determined by arteriovenous differences and flow rate measurements through the coronary sinus in dogs. This decrease becomes greater as one shunts increasing fractions of the blood returning from the lungs to the left heart. When the bypass takes all blood returning to the left atrium, oxygen utilization is about 40% of control values.

In view of this finding, we have studied methods to bypass the left heart without thoracotomy, and have developed a technique by which a cannula is passed down the jugular vein into the right atrium, through the fossa ovalis, and into the left atrium. With such a cannula of 7 mm. in internal diameter we can bypass 4.2 liters of blood per minute in the dog, the blood passing from the cannula to a flexible, airtight reservoir, a flowmeter, a pump, and back by way of the femoral artery. No oxygenator is needed, of course. Pressure tracings of the left atrium, the left ventricle, and the aortic arch show that we can maintain a normal aortic pressure by such a bypass while the left ventricular systolic pressure remains at less than half the aortic pressure. Angiocardiograms on the Elema-Schonander apparatus confirm that dye injected into the pulmonary artery during complete bypass of this type without thoracotomy returns to the left atrium but does not enter the left ventricle. The aorta is seen to fill only in retrograde fashion from the femoral return.

We have thus far used this technique once on man, the patient being a man with a five-day-old massive posterior infarct with ventricular septal perforation. Incannulation was uneventful, no irregularities of rhythm were produced, and bypass was carried 9 hours at rates of from 3.8 to 5.0 liters per minute before it became clear he could not survive unless the defect could be closed. Thoracotomy was made, right heart bypass was added, and a heat exchanger was employed to lower body temperature to permit cessation of circulation during repair. After repair of a defect which admitted three fingers and rewarming, the blood pressure without pump support was maintained at normal levels for a time, but the quality of the muscle and the type of repair employed were such that the septal suture

line to the posterior ventricular wall was insecure, the ivalon mattresses ultimately pulling through the ventricular wall, with loss of the patient. We believe that on another occasion the lessons of this case will improve our likelihood of patient survival.

It is hoped this technique may permit us to help patients with acute left heart failure from mitral disease or aortic stenosis who have proven unresponsive to medical efforts at preparation for operative intervention. We hope also that it may permit conservation of myocardium in coronary occlusion by performance of coronary arterioplasty before extensive infarction takes place.

I shall not have quite enough funds from other sources to carry work here through the year and to permit also the return to Brooklyn of certain equipment developed here which is essential to such studies. I should like therefore to request that I be permitted to use up to 1,000 dollars of Grant 60 G 70 at Karolinska Institutet. The mechanics of transfer of such funds from the Research Foundation of State University of New York have already been developed and used for funds from other sources. A small amount of support from the American Heart Association has already been used to purchase certain supplies in the United States for shipment to me here for the work above described.

I propose to return to State University of New York in August, 1961, and to continue to work on this problem during the coming year. Dr. Senning, Dr. Hall, and Dr. Moreno are moving to Zürich later this spring, where they also hope to continue it after getting a research laboratory into being.

Let me once again express my profuse thanks for the support which the Association has given and I hope may continue to give to my research efforts and those of my associates.

Very sincerely yours,

Clarence Dennis

Clarence Dennis, M.D.

cc: Mr. Mort Grant
Dr. K. E. Karlson
Dr. J. H. Stuckey